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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/687,541	10/16/2003	David A. Morgenstern	MTC 6888.2(40-21(52925)C)	7748
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SENNIGER POWERS ONE METROPOLITAN SQUARE 16TH FLOOR ST LOUIS, MO 63102			ECHELMAYER, ALIX ELIZABETH	
			ART UNIT	PAPER NUMBER
			1795	
			NOTIFICATION DATE	DELIVERY MODE
			01/04/2008	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspatents@senniger.com

## Office Action Summary

**Application No.**

10/687,541

**Applicant(s)**

MORGENSTERN, DAVID A.

**Examiner**

Alix Elizabeth Echelmeyer

**Art Unit**

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 October 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-52, 88-108 and 117-130 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-52, 88-108 and 117-130 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Response*

1. This Office Action is in response to the arguments filed October 11, 2007. Claims 1-52, 88-108 and 117-130 are pending and are rejected finally for the reasons given below.

### *Claim Interpretation*

2. The product-by-process limitations of claims 1, 4-6, 9-11, 33-35, 39-41, 88-90, 101, 106-108, 117-119 and 127 are not given patentable weight since the courts have held that patentability is based on a product itself, even if the prior art product is made by a different process (see In re Thorpe, 227 USPQ 964, (CAFC 1985), In re Brown, 173 USPQ 685 (CCPA 1972), and In re Marosi, 218 USPQ 289, 292-293 (CAFC 1983)).

Claims 1, 88-90, 101, 106-108, 117-119 and 127 are drawn to methods for forming the catalyst. While the claims are process claims, the process of those claims is that of reforming a feed gas to produce hydrogen, and not the process of forming the catalyst.

Additionally, claims 4-6, 9-11, 33-35 and 39-41 are drawn to the method by which the surface area is measured, specifically the Brunauer-Emmett-Teller method. That method is not given patentable weight since the surface area limitations are met.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-52, 88-108 and 117-130 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marino et al. (Hydrogen from Steam Reforming of Ethanol) in view of Sargent (US Patent 2,892,801).

Marino et al. teach a catalyst made of copper on the surface of a porous alumina substrate (abstract; p. 1095 2<sup>nd</sup> column).

Regarding claims 2, 20, 94 121 and 122, the catalyst is used to reform ethanol to produce hydrogen (Introduction).

As for claims 3, 21, 32 and 50, Marino et al. teach that the hydrogen produced may be used in a fuel cell. It would have been obvious to one having ordinary skill in the art to provide hydrogen and oxygen to a fuel cell, since both components are needed for the fuel cell to produce electricity.

With regard to claims 4-6, 9-11, 33-35 and 39-41, Marino et al. teach that the surface area of copper in the catalyst may be 98.80 m<sup>2</sup>/g (Table 4. p. 1099). It is the position of the examiner that 98.80 is about 80. As for the method by which the surface area is measured, as discussed above, the method by which the surface area is measured is not given patentable weight since the surface area limitations are met.

As for claims 22-24, 28 and 123, Marino et al. teach that the reaction is carried out at 300°C (p. 1096 column 1).

Regarding claims 1, 12, 25-27, 38, 42, 51, 52, 88-93, 101-108 and 117-120, and 127-130, Marino et al. fail to teach that the substrate is a metal, specifically nickel. Marino et al. do teach that the presence of nickel is desirable in the catalyst, since the presence of nickel tends to ensure that copper will stay on the surface of the substrate (p. 1097 2<sup>nd</sup> column) and that the addition helps to maximize hydrogen production (p. 1-99 1<sup>st</sup> column).

Sargent teaches a catalyst made of a copper-plated nickel sponge (column 1 lines 40-44). Sargent further teaches that the catalyst may be used in dehydrogenation (column 4 lines 44-47).

As for claims 7, 8, 15, 16, 36, 37, 45 and 46, Sargent teaches that the final catalyst may be from 0.5 percent to 75 percent by weight copper (column 2 lines 21-24). Specific examples 5 and 6 on columns 3 and 4 teach that the catalyst may be as much as 27.0 or 44.4 percent by weight copper.

Regarding claims 13, 14, 43 and 44, Example 1 of Sargent teaches a catalyst of 9.5 percent by weight copper (column 3). This would yield a catalyst of 90.5 percent by weight nickel.

As for claims 95, 98 and 124, since the catalyst, reactant, and temperature are the same as in the presently claimed invention, the reaction would inherently produce methane.

Regarding claims 96, 97, 99, 100, 125 and 126 it is well known to run internal combustion engines on gaseous fuels such as methane and hydrogen (see, for example, US Patent 5,398,663 column 1 lines 20-24).

With regard to claims 17-19 and 47-49, since the catalyst structure, including the amount and surface area of the components, is identical to the presently claimed invention, the amount of nickel at the surface of the catalyst would inherently be the same in the combination of Marino et al. and Sargent as in the instantly claimed invention.

With regard to claims 29-31, since the catalyst structure, including the amount and surface area of the components, is identical to the presently claimed invention, the thermal conductivity of the catalyst would inherently be the same in the combination of Marino et al. and Sargent as in the instantly claimed invention.

It would be desirable to use the copper plated nickel sponge of Sargent as the catalyst in the reaction of Marino et al. since Marino et al. teach that the presence of nickel improves the performance of a copper catalyst.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the copper plated nickel sponge of Sargent as the catalyst in the reaction of Marino et al. since Marino et al. teach that the presence of nickel improves the performance of a copper catalyst.

***Response to Arguments***

5. Applicant's arguments filed October 11, 2007 have been fully considered but they are not persuasive.

The arguments concerning the Claim Interpretation are not found to be persuasive. Applicant argues that, since the claims are drawn to a process, they cannot be considered product-by-process claims. In fact, as discussed above, the claims are interpreted as having product-by-process *limitations*. The MPEP states that "the *structure implied by the process steps* should be considered when assessing the patentability of product-by-process claims over the prior art, especially where the product can only be defined by the process steps by which the product is made, or where the manufacturing process steps would be expected to impart distinctive structural characteristics to the final product. See, e.g., *In re Garnero*, 412 F.2d 276, 279, 162 USPQ 221, 223 (CCPA 1979)" MPEP 2113 (emphasis added by examiner). In this case, the structure implied is the catalyst, and the process steps are the limitations to how the catalyst was made. The examiner has considered fully the process that the claim is drawn to, specifically, the process for reforming alcohol. As long as the structure implied by the process limitations has been rejected, the method of making the structure is not given patentable weight. It is the belief of the examiner that, although the MPEP 2113 discusses product-by-process *claims*, it applies to this situation to the product-by-process *limitations*.

Applicant further adds that the method for measuring the surface area should be given patentable weight "since different surface area measuring techniques may result

in different surface area determinations" (p. 3). The examiner is not convinced that different surface area measuring techniques would result in a different surface area determination beyond the standard deviation of the claimed method. Applicant has not provided any evidence that other techniques give different determinations, or that the different determinations are so inaccurate that only the claimed method can be trusted.

Next, Applicant discusses the New Rejection under 35 U.S.C. 103 (a). Applicant argues that one of ordinary skill in the art would not be motivated to combine Marino et al. with Sargent because, according to Applicant, Marino et al. teach away from the use of a metal supporting structure because Marino et al. "emphasiz[e] the importance of the  $\gamma$ -Al<sub>2</sub>O<sub>3</sub> supporting structure in the ethanol reforming reaction" (p. 6). Emphasizing the virtues of one support does not equate to teaching away from another support. Perhaps the author believed that no other support should be used, perhaps he knew that other supports might be better, perhaps he even knew that Raney nickel would be a better support than the one taught. The reference is an academic paper, simply teaching the use of a copper catalyst supported on  $\gamma$ -Al<sub>2</sub>O<sub>3</sub>. If the reference stated that Raney nickel, or even metal substrates, should not be used, then the examiner might consider that the reference was teaching away from their use. Further, Marino et al. does teach that nickel is advantageous in their catalyst. One of ordinary skill in the art could be inspired to experiment with the amount of nickel or even a nickel support, especially when in light of a that teaching suggests the use of a nickel supported copper catalyst for dehydrogenation, as in Sargent.



Next, Applicant argues that one of ordinary skill in the art would not look to Sargent, and the teaching of a Raney nickel support for a copper catalyst for dehydrogenation, because the primary reference does not teach metal substrates. It is the belief of the examiner that the primary reference does not need to teach metal substrates for one of ordinary skill in the art to use a metal substrate when there is a teaching (Sargent) of a Raney nickel support for a copper catalyst for dehydrogenation.

Applicant argues that one of ordinary skill in the art would further be discouraged from looking to Sargent because "Sargent fails to teach or suggest that the catalyst he discloses is suitable for any **gas-phase** reaction ..." (p. 8, emphasis Applicant's). In fact, the reference does not limit the phase for reaction, especially dehydrogenation. While some of the embodiments may teach liquid-phase hydrogenation, one of ordinary skill in the art would not recognize that the catalyst could not be used for gas-phase reactions, especially when the dehydrogenation reaction is not limited to liquid-phase.

As evidence that one of ordinary skill in the art at the time the instant invention was made would recognize that the catalyst of Sargent could be used for gas-phase dehydrogenation, the examiner directs Applicant to Hodge (US 3,960,898) and "Safety Data for tert-butyl alcohol" (Safety Data). Hodge teaches dehydrogenation of tertiary butyl alcohol using Raney nickel at 80°C - 200°C (column 8 lines 54-58). Safety Data teaches that the boiling point of tertiary butyl alcohol is 83°C. One of ordinary skill in the art would recognize that a dehydrogenation of alcohol (as taught in Marino et al.) could

be done using copper catalyst supported by Raney nickel (as taught by Sargent), using a gas-phase alcohol (based on the teachings of Hodge and Safety Data).

Applicant next argues that the instant invention produces unexpected results over Marino et al. Applicant cites data from the process taught in Marino et al., using the copper catalyst supported by  $\gamma\text{-Al}_2\text{O}_3$  and compares it to data from the process of the instant invention, wherein the copper catalyst is supported by Raney nickel. This is a piecemeal analysis of the prior art. One cannot attack references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Essentially, Applicant is comparing apples to oranges. The two data sets are not commensurate in scope. Applicant would need to show unexpected results of the data from the instant invention compared to data from the *combination* of Marino et al. and Sargent, not simply the base reference, since the rejection is based on the combination and not simply the Marino et al. reference. One of ordinary skill in the art would not expect the results from the Marino et al. reference alone to be the same as the instant invention, since the two processes use different catalysts. If Applicant were to compare data from the instant invention to data from the combination of Marino et al. and Sargent and find unexpected results, then this argument might be convincing, and in that case, Applicant would be comparing apples to apples.

***Conclusion***

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is 571-272-1101. The examiner can normally be reached on Mon-Fri 7-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy N. Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.


Application/Control Number:  
10/687,541  
Art Unit: 1795

Page 11

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Examiner  
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